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CHAPTER 2 ACTIVITY: WHERE DO YOU STAND?

How does your height compare to the heights of your classmates? This activity will reveal your relative *stand*ing in your class.

Collecting Data

1. How tall are you, in inches?

2. Record the height (in inches) of every student in the class here. Include your height.

Data Analysis

3. Make a dotplot of these data. Be sure to properly label and scale the axis.

4. Describe the shape of this distribution of heights.

5. Compute summary statistics for your class. Record them in the table below.

n	mean	SD	min	Q_1	med	Q_3	max	IQR	Range

6. Compute the percentile and standardized score (z-score) for your height. Interpret these values.

   Percentile:

   Interpretation:

   z-score:

   Interpetation:

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Changing Units

7. Soon, we will convert the heights to centimeters. Before we do, predict the shape of the distribution of height in centimeters. (1 in = 2.54 cm)

8. Complete the table with your predictions for the summary statistics for the distribution of height in centimeters.

n	mean	SD	min	Q_1	med	Q_3	max	IQR	Range

9. Convert the heights of every student to centimeters and use technology to make a dotplot of this distribution. Record the dotplot here, appropriately labeling and scaling the axis. Was your prediction for the shape correct?

10. If you haven't done so already, compute the summary statistics for the distribution of height in centimeters. Were your predictions correct?

11. Compute the percentile and standardized score (z-score) for your height in centimeters. Are you surprised? Why do these results make sense?

    Percentile:

    z-score:

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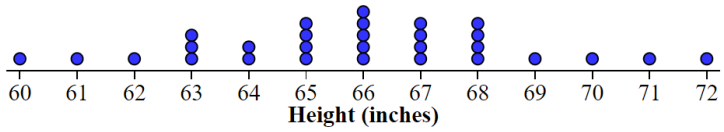
Teacher Notes

This activity reviews the ideas of measures of location/position (percentiles and standardized scores), and linear transformations to data. By the end of the activity, students realize a neat fact: an individual's percentile and z-score don't change after a linear transformation! If you have a small class, you can add your students' data to these data from one of Mr. Tyson's classes.

Height (inches)					
	60	61	62	63	63
	63	64	64	65	65
	65	65	66	66	66
	66	66	67	67	67
	67	68	68	68	68
	69	70	71	72	

Suggested Answers

1. Answers will vary by student.
2. Answers will vary by class.
3. Answers will vary by class. Here is one possible dotplot, using the data from one of Mr. Tyson's classes (shown in the Teacher Notes above).



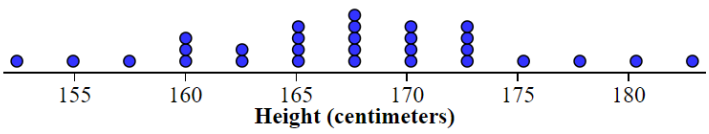
4. Answers will vary by class. For the data from Mr. Tyson's class, the distribution of height in inches is approximately symmetric with a peak at 66 inches.
5. Answers will vary by class. Here is the completed table for the data from Mr. Tyson's class.

n	mean	SD	min	Q_1	med	Q_3	max	IQR	Range
29	65.93	2.81	60	64	66	68	72	4	12

6. Answers will vary by student. For a student who is 63 inches in Mr. Tyson's class: Percentile = 3/29 ≈ 10%. About 10% of the students in this class have heights less than 63 inches. z-score = (63 – 65.93)/2.81 = –1.04. A student who is 63 inches tall has a height that is 1.04 standard deviations less than the mean height (65.93 inches) of students in this class.
7. Answers will vary by student. Hopefully, they will predict the same shape as the distribution of height in inches. For Mr. Tyson's class, the distribution of height in centimeters is predicted to be approximately symmetric with a peak at 2.54 × 66 = 167.64 centimeters.
8. Answers will vary by student. Hopefully, students will predict values that are 2.54 times larger than the table for height in inches (except for the sample size n). For the data from Mr. Tyson's class:

n	mean	SD	min	Q_1	med	Q_3	max	IQR	Range
29	167.465	7.15	152.4	162.56	167.64	172.72	182.88	10.16	30.48

9. Answers will vary by class. Here is the dotplot for Mr. Tyson's class.



10. Answers will vary by student.
11. Answers will vary by student. For a student who is 63 inches in Mr. Tyson's class:
    Percentile = 3/29 ≈ 10%. z-score = (63*2.54 – 167.45)/(7.15) = –1.04. These values are the same as for height in inches. This isn't surprising because everyone's height was transformed in the same way, so each student is still in the same position relative to the other students.
    Note for #10 & 11: if students use values from calculated by software, minor discrepancies may occur due to rounding.

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